CLAIMS

What is claimed is:

1. A method for retrofitting a power plant that reduces the consumption of fossil fuel using compressed heated air comprising:

   a. retrofitting the power plant by adding at least three heat exchangers, a vessel, a pump, and a control system to the power plant, wherein a first heat exchanger receives compressed heated air from a power source and produces heated heat exchange fluid;

   b. supplying heated heat exchange fluid to a second heat exchanger that heats a hydrocarbon flow for the power plant that drives a turbine coupled to a generator and produces power and additional hot exhaust gases;

   c. pumping a heat exchange fluid through a first heat exchanger around a first set of tubes containing the compressed heated air in the first set of tubes forming heated heat exchange fluid;

   d. removing compressed cooled air from the first set of tubes in the first heat exchanger;

   e. removing the heated heat exchange fluid from the first heat exchanger, passing at least a first portion of the heated heat exchange fluid from the first heat exchanger to a second heat exchanger, and a second portion of the heated heat exchange fluid from the first heat exchanger to a vessel;

   f. injecting a hydrocarbon flow into a second set of tubes in the second heat exchanger and flowing the heated heat exchange fluid into the second heat exchanger around the second set of tubes transferring heat from the heated heat exchange fluid to the hydrocarbon flow forming a heated hydrocarbon flow and a cooled heat exchange fluid, and wherein the second heat exchanger increases the

hydrocarbon flow temperature between 50% and 900%, then discharging the heated hydrocarbon flow to a hydrocarbon flow outlet, and flowing the cooled heat exchange fluid to the vessel;

g. using the vessel to accommodate thermal expansion of the fluid from the first heat exchanger, the second heat exchanger, or combinations thereof;

h. passing at least a portion of the heat exchange fluid from the vessel to a third heat exchanger and from the third heat exchanger to a pump; and

i. pumping the cooled heat exchange fluid from the vessel to the first heat exchanger, wherein at least a portion of the cooled heat exchange fluid passing from the vessel to the first heat exchanger flows through a conduit to the .

2. The method of claim 1, wherein the turbine is a gas turbine, or a combustion turbine.

3. The method of claim 1, wherein the power source is a turbine, a turbine rotor, a compressor, a main exhaust stack of the power source, or combinations thereof.

4. The method of claim 1, wherein the compressed heated air is injected at a pressure between 80 psia and 300 psia.

5. The method of claim 9, wherein the compressed heated air is injected at a pressure between 89 psia and 270 psia.

6. The method of claim 1, wherein the compressed cool air is removed from the first heat exchanger at a pressure between 80 psia and 300 psia.

7. The method of claim 1, wherein the cooling in the first heat exchanger occurs at a temperature between 300 degrees F and 500 degrees F.

8. The method of claim 1, comprising the step of using a fin/fan heat exchanger as the third heat exchanger.

9. The method of claim 1, wherein the cooling in the third heat exchanger is by a fan that cools the pressurized heat exchange fluid by up to 95%.

10. The method of claim 1, wherein the step of flowing the hydrocarbon flow is by flowing a member consisting of the group oil, natural gas, methane, propane, and combinations thereof.

11. The method of claim 15, further wherein step of flowing the hydrocarbon flow is at a rate between 10 ft/lbs per second and 40 ft/lbs per second.

12. The method of claim 1, wherein the step of using a vessel involves using a vessel adapted to sustain a pressured heat exchange fluid between 15 psia and 300 psia.

13. The method of claim 1, wherein step of pumping the heat exchange fluid is by pumping of a mineral oil or pumping a glycol through the first, second and third heat exchangers.

14. The method of claim 1, further comprising the step of using a bypass line between the first heat exchanger and the vessel.

15. The method of claim 1, further comprising the step of using a control panel, at least one sensor, and a central processing unit in communication with the control panel and sensor to monitor and compare the pressurized heat exchange fluid in to a preset value.

16. A method for retrofitting a power plant that reduces the consumption of fossil fuel using hot exhaust gas comprising:

a. retrofitting the power plant by adding at least three heat exchangers, a vessel, a pump, and a control system to the power plant wherein a first heat exchanger receives hot exhaust gas air from a power source and produces heated heat exchange fluid;

b. supplying heated heat exchange fluid to a second heat exchanger that heats a hydrocarbon flow for the power plant that drives a turbine coupled to a generator and produces power and additional hot exhaust gases;

c. pumping a heat exchange fluid through a first heat exchanger around a first set of tubes containing the hot exhaust gas in the first set of tubes forming heated heat exchange fluid;

d. removing cooled exhaust gas from the first set of tubes in the first heat exchanger;

e. removing the heated heat exchange fluid from the first heat exchanger, passing at least a first portion of the heated heat exchange fluid to a second heat exchanger and a second portion of the heated heat exchange fluid from the first heat exchanger to a vessel;

f. injecting a hydrocarbon flow into a second set of tubes in the second heat exchanger and flowing the heated heat exchange fluid into the second heat exchanger around the second set of tubes transferring heat from the heated heat exchange fluid to the hydrocarbon flow forming a heated hydrocarbon flow and a cooled heat exchange fluid, and wherein the second heat exchanger increases the hydrocarbon flow temperature between 50% and 900%, and then discharging the heated hydrocarbon flow to a hydrocarbon flow outlet, and flowing the cooled heat exchange fluid to the vessel;

g. using the vessel to accommodate thermal expansion of the fluid from the first heat exchanger, the second heat exchanger, or combinations thereof;

h. passing at least a portion of the heat exchange fluid from the vessel to a third heat exchanger and from the third heat exchanger to a pump; and

i. pumping the cooled heat exchange fluid from the vessel to the first heat exchanger, wherein at least a portion of the cooled heat exchanger fluid passing from the vessel to the first heat exchanger flows through a conduit and back to the vessel.

17. The method of claim 16, wherein the turbine is a gas turbine, or a combustion turbine.

18. The method of claim 16, wherein the power source is a turbine, a turbine rotor, a compressor, a main exhaust stack of the power source, or combinations thereof.

19. The method of claim 16, wherein the hot exhaust gas is injected at a pressure between 80 psia and 300 psia.

20. The method of claim 19, wherein the hot exhaust gas is injected at a pressure between 89 psia and 270 psia.

21. The method of claim 16, wherein the compressed cool air is removed from the first heat exchanger at a pressure between 80 psia and 300 psia.

22. The method of claim 16, wherein the cooling in the first heat exchanger occurs at a temperature between 300 degrees F and 500 degrees F.

23. The method of c laim 16, comprising the step of using a fin/fan heat exchanger as the third heat exchanger.

24. The method of claim 16, wherein the cooling in the third heat exchanger is by a fan that cools the pressurized heat exchange fluid by up to 95%.

25. The method of claim 16, wherein the step of flowing the hydrocarbon flow is by flowing a member consisting of the group oil, natural gas, methane, propane, and combinations thereof.

26. The method of claim 25, further wherein step of flowing the hydrocarbon flow is at a rate between 10 ft/lbs per second and 40 ft/lbs per second.

27. The method of claim 16, wherein the step of using a vessel involves using a vessel adapted to sustain a pressured heat exchange fluid between 15 psia and 300 psia.

28. The method of claim 16, wherein step of pumping the heat exchange fluid is by pumping of a mineral oil or pumping a glycol through the first, second and third heat exchangers.

29. The method of claim 16, further comprising the step of using a bypass line between the first heat exchanger and the vessel.

30. The method of claim 16, further comprising the step of using a control panel, at least one sensor, and a central processing unit in communication with the control panel and sensor to monitor and compare the pressurized heat exchange fluid in to a preset value.